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RESEARCH ARTICLE

GENERAL PRACTITIONER-CENTERED PEDIATRIC PRIMARY CARE LOWERS HOSPITALIZATION RISK FOR MENTAL DISORDERS IN CHILDREN AND ADOLESCENTS WITH ADHD

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Abstract

Introduction: Attention-deficit/hyperactivity disorder (ADHD) is a prevalent neurodevelopmental disorder among children and adolescents, often leading to significant comorbid mental health issues and increased hospitalization rates. This study evaluated the impact of GP-centred paediatric primary care on hospitalization rates for mental disorders among children and adolescents diagnosed with ADHD.

Methods: The study was conducted involving 240 patients with ADHD, divided into two groups: 120 patients receiving GP-centred care and 120 receiving standard care. Data were collected on hospitalizations, psychopharmaceutical prescriptions, and psychotherapy sessions from 2023 to 2024. Descriptive and inferential statistical analyses were performed, including multivariable regression models to adjust for potential confounders.

Results: The intervention group exhibited a significantly lower hospitalization rate for mental disorders (12.5%) compared to the control group (25.0%; $p = 0.015$). Additionally, fewer patients in the intervention group received psychopharmaceuticals (37.5% vs. 62.5%; $p = 0.004$), indicating a reduction in medication reliance. However, no significant variation was observed in psychotherapy sessions between the groups (16.7% vs. 25.0%; $p = 0.156$).

Conclusion: The GP-centred paediatric primary care programme significantly reduced hospitalization rates and psychopharmaceutical prescriptions among children and adolescents with ADHD. This indicates that integrated care models may effectively improve mental health outcomes in this population.

Recommendations: Future research should explore the long-term effects of GP-centred care on ADHD management and assess its applicability in diverse healthcare settings. Additionally, enhancing access to

psychotherapy services within the GP-centred model may further optimize outcomes.

Keywords: ADHD, Gp-Centred Care, Mental Health, Hospitalization, Psychopharmaceuticals, Paediatric Primary Care

BACKGROUND/INTRODUCTION

The neurodevelopmental illness known as attention-deficit/hyperactivity disorder (ADHD) is common in children and adolescents and is typified by recurrent patterns of hyperactivity, impulsivity, and inattention. One of the most prevalent psychiatric diseases in children, ADHD is estimated by the World Health Organisation to have a 5% global prevalence [1, 2]. Beyond just causing problems in the classroom, ADHD increases a child's likelihood of developing comorbid mental health conditions like sadness and anxiety, which can seriously impede their functioning [3]. As a result, successful management techniques are essential to enhancing the results for those who are impacted.

Pharmacological therapies, such as stimulant medicines, have been the mainstay of ADHD management historically due to their shown efficacy in lowering core symptoms. But relying only on medicine might not be able to meet all of a child's demands when it comes to ADHD, especially when it comes to comprehensive care and psychological support. The value of a comprehensive strategy that incorporates behavioural treatments, psychoeducation, and family participation is becoming increasingly apparent [4]. Since general practitioners (GPs) play a unique role in coordinating health services and building lasting relationships with patients and families, they are well-positioned to provide this integrated care [5].

GP-centred paediatric care programmes have emerged as a promising model for managing ADHD and associated comorbidities. These programmes emphasize collaboration among healthcare providers, active involvement of families, and continuous monitoring of patients' progress. Recent studies have indicated that GP-centred care can lead to improved clinical outcomes, including reduced hospitalization rates and better medication adherence [6,7]. However, there remains a lack of comprehensive data on the effectiveness of such programmes specifically for children and adolescents with ADHD.

The present study to assess the impact of GP-centred paediatric primary care on the risk of hospitalization for mental disorders among children and adolescents with ADHD.

MATERIALS AND METHODS

Study Design: A retrospective cohort design.

Study Setting: The study was conducted at Patna Medical College Hospital, India. The cohort comprised patients with a diagnosis of ADHD who

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were followed up through 2024. Data were subjected to stringent quality controls and checks, ensuring high-quality, reliable information for analysis. The study involved health care settings including general practitioners and specialists involved in the diagnosis and management of ADHD in children and adolescents.

Participants

The cohort consisted of 240 patients aged 3 to 18 years with a documented diagnosis of ADHD (ICD Codes F90.0–F90.9). Patients in a GP-centered paediatric care program made up the intervention group, and their results were compared to those of a control group of patients who weren't part of the program.

Follow-up data were recorded until the end of 2024. Patients' baseline characteristics, including sex, congenital malformations, allergies, asthma, obesity, and comorbidities, were collected in 2023, while additional clinical indicators (Charlson comorbidity index and nursing level) were assessed in 2024.

Inclusion Criteria

- Diagnosis of ADHD (ICD-Code: F90.0–F90.9).
- Continuous insurance coverage.
- Age 18 years or younger.

Exclusion Criteria

The study did not include any patients who were less than three years old.

Bias

Potential sources of bias in the study include selection bias, as patients were not randomized into the intervention or control groups. To mitigate bias, baseline characteristics such as age, sex, and comorbidities were carefully documented and controlled for in the analysis. In addition, administrative data were rigorously checked for quality and consistency through independent verification processes.

Variables

- Dependent variable: Hospitalization for a mental disorder (ICD-10-F code) at least once.
- Independent variable: Enrollment in the GP-centred paediatric care programme.

Secondary outcomes included the prescription of psychopharmaceuticals and psychotherapy sessions in 2024.

Data Collection

Data were extracted from administrative claims submitted by physicians to health insurance and underwent multiple layers of quality control. The data included diagnostic codes (ICD-10), medication prescriptions (ATC codes), healthcare utilization, and clinical indicators for each patient.

Procedure

ICD-10 diagnosis codes were used to determine the presence of ADHD in the patients. Patients who saw a GP but were not enrolled in the GP-centered paediatric care program were classified as the control group, while those who were engaged in the program

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were classified as the intervention group. To properly identify patients, the time of the first visit with a general practitioner following an ADHD diagnosis was evaluated. All information was gathered retroactively from claims that were filed in 2023–2024.

Statistical Analysis

For each variable, descriptive analyses were done. Mean, SD, median, quartiles, minimum, and maximum were determined for continuous variables. There were absolute and relative frequencies for categorical variables. GP-centered care and mental health hospitalisation were studied using multivariable regression models. Negative-binomial regression was used for count data and logistic regression for binary outcomes. Binary and count variables' ORs and RRs were provided with 95% confidence intervals. Statistical significance was set at p-values <0.05. SAS 9.4 and IBM SPSS Statistics 25 were used for all statistical analyses.

Ethical considerations

The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

RESULTS

A total of 240 patients with ADHD were included in the study, divided into two groups: the intervention group (GP-centred paediatric care programme) consisting of 120 patients, and the control group (non-participants) comprising 120 patients (Table 1).

Table no.1: Demographic and Clinical Characteristics

Characteristic	Intervention Group (n = 120)	Control Group (n = 120)	p-value
Age (years)			
Mean (SD)	10.5 (4.2)	10.2 (4.1)	0.456
Sex			
Male (%)	72 (60.0)	74 (61.7)	0.834
Female (%)	48 (40.0)	46 (38.3)	
Nursing Level			
Level 1 (%)	24 (20.0)	22 (18.3)	0.754
Level 2 (%)	36 (30.0)	32 (26.7)	
Level 3 (%)	30 (25.0)	34 (28.3)	

Level 4 (%)	20 (16.7)	24 (20.0)	
Level 5 (%)	10 (8.3)	8 (6.7)	
Comorbidities			
Allergies (%)	30 (25.0)	32 (26.7)	0.788
Asthma (%)	15 (12.5)	14 (11.7)	0.864
Obesity (%)	10 (8.3)	8 (6.7)	0.685
Congenital Malformations (%)	5 (4.2)	6 (5.0)	0.780

The primary outcome, mental illness hospitalisation, occurred in 15 (12.5%) intervention patients and 30 (25.0%) control patients. Table 2 shows that the intervention group had a significantly reduced hospitalisation risk than the control group.

Table no.2: Hospitalization for Mental Disorders

Outcome	Intervention Group	Control Group	p-value
Hospitalization for Mental Disorder	15 (12.5%)	30 (25.0%)	0.015
Relative Risk	0.50		

Secondary outcomes included the prescription of psychopharmaceuticals and psychotherapy sessions. Table 3 summarizes the findings for these outcomes.

A multivariable regression analysis was conducted to adjust for potential confounders. Table 4 presents the odds ratios (OR) for hospitalization for mental disorders and prescriptions of psychopharmaceuticals, adjusted for age, sex, nursing level, comorbidities, and rural residence.

Table no.3: Secondary Outcomes

Outcome	Intervention Group	Control Group	p-value
Prescription of Psychopharmaceuticals (%)	45 (37.5%)	75 (62.5%)	0.004
Received Psychotherapy (%)	20 (16.7%)	30 (25.0%)	0.156

Table no.4: Multivariable Regression Analysis for Hospitalization and Prescription Outcomes

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Covariate	Hospitalization OR (95% CI)	Prescription OR (95% CI)
GP-Centred Care Programme	0.45 (0.25 - 0.80)	0.38 (0.20 - 0.71)
Age (years)	1.05 (0.95 - 1.15)	1.10 (1.02 - 1.18)
Male Sex	1.20 (0.65 - 2.24)	1.05 (0.56 - 1.97)
Nursing Level 1-3	Reference	Reference
Nursing Level 4	1.15 (0.50 - 2.66)	0.95 (0.43 - 2.12)
Congenital Malformations	1.50 (0.54 - 4.14)	1.25 (0.43 - 3.65)
Allergies	1.25 (0.65 - 2.40)	0.85 (0.43 - 1.66)
Asthma	1.75 (0.78 - 3.91)	1.10 (0.42 - 2.89)
Obesity	1.60 (0.70 - 3.63)	1.80 (0.68 - 4.76)
Rural Residence	0.90 (0.50 - 1.60)	0.80 (0.43 - 1.50)

DISCUSSION

240 children and adolescents with ADHD diagnoses were examined in this study; they were split into two groups, one receiving GP-centered paediatric care and the other receiving standard treatment. There were no appreciable changes in the age, sex, nursing levels, or comorbidities of the two groups' clinical or demographic features. Because of the baseline characteristics' uniformity, it is possible to credit observed outcomes to the care model instead of underlying group disparities.

Hospitalisation for mental disorders, the study's main endpoint, was considerably lower in the intervention group—just 12.5% of patients needed to be admitted, compared to 25.0% in the control group ($p = 0.015$). This suggests that proactive, all-encompassing treatment may successfully manage ADHD symptoms and related mental health difficulties. Children and adolescents involved in the GP-centered paediatric care program were half as likely to be hospitalised for mental illnesses. The GP-centered care paradigm has a protective impact, as seen by the intervention group's 0.50 relative risk of hospitalisation.

Additionally, secondary outcomes related to the prescription of psychopharmaceuticals and psychotherapy were examined. With 37.5% of patients in the intervention group and 62.5% in the control group receiving medication, the intervention group's rate of psychopharmaceutical prescriptions was significantly lower ($p = 0.004$). This result implies

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that the GP-centered approach may lessen the need for medication to treat ADHD symptoms in addition to lowering hospitalisation rates. Though the care model may influence medication use, it does not always transfer into differences in accessing psychotherapy services, as evidenced by the lack of statistical significance in the differences in psychotherapy sessions between the groups.

Further analysis using multivariable regression models adjusted for potential confounders such as age, sex, nursing level, and comorbidities. The results confirmed the protective effect of the GP-centred care programme, with an odds ratio of 0.45 for hospitalization due to mental disorders and an odds ratio of 0.38 for psychopharmaceutical prescriptions. This reinforces the hypothesis that integrated, GP-led care can significantly improve health outcomes for children and adolescents with ADHD by reducing both the need for hospitalization and the reliance on pharmacological treatment.

Overall, the findings of this study underscore the potential benefits of GP-centred paediatric primary care in managing ADHD among children and adolescents. This approach may help young ADHD patients have better mental health outcomes and a higher quality of life by lowering hospital stays and pharmaceutical prescriptions. These findings support the integration of such care models into standard practice by highlighting the significance of improving access to comprehensive primary care services that are customised to meet the unique requirements of children and adolescents with ADHD.

A retrospective cohort study in Germany revealed that children and adolescents with ADHD who were enrolled in a GP-centred pediatric primary care program had a 33% lower risk of hospitalisation due to mental disorders compared to those who received usual care. These children were also less likely to receive stimulant medications but showed no significant differences in their participation in cognitive-behavioural therapy (CBT) between groups [8].

In a cross-sectional study examining referral patterns to child and adolescent mental health services (CAMHS), it was found that general practitioners were the main source of referrals for ADHD. However, referrals from GPs had higher rejection rates compared to other referral sources. The study suggests that improving referral processes and communication between GPs and CAMHS could help in optimizing care for ADHD patients [9].

Awareness and understanding of ADHD among GPs have also been highlighted as key factors in effective care delivery. One study indicated that GPs in the UK faced significant challenges in diagnosing and managing ADHD due to limited awareness and misconceptions about the condition. This study called for enhanced education and training for GPs to improve ADHD diagnosis and treatment outcomes [10].

Further, a review from the European ADHD Guidelines Group stressed the importance of timely interventions and a patient-centred approach for

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managing ADHD in children and adolescents. The study emphasized the role of GPs in facilitating access to care, ensuring that treatment aligns with individual patient needs and long-term outcomes, and supporting a multidisciplinary approach involving paediatricians and mental health specialists [11].

In Australia, a pilot study tested a GP-paediatrician integrated model of care to improve pediatric health outcomes, including mental health services for ADHD. The study found that this integrated model reduced unnecessary referrals to hospitals and improved both the quality of care and the confidence of GPs in managing paediatric mental health conditions like ADHD. Additionally, families reported increased satisfaction with the quality of GP care [12].

A systematic review on patient-centred medical home (PCMH)-based care models, which integrate GPs in chronic disease management, found that these models significantly improved mental health outcomes, including reductions in hospital admissions for conditions like ADHD. PCMH-based care emphasizes a multidisciplinary approach, which enhances the role of GPs in delivering comprehensive care and managing ADHD [13].

Moreover, another study explored the role of multidisciplinary teams, including GPs, in assessing and managing neurodevelopmental disorders such as ADHD. It concluded that integrated care, involving multiple health professionals, improves diagnostic accuracy and long-term outcomes for children with ADHD. This team-based approach ensures holistic care for complex cases [14].

Lastly, a study from Ireland investigated GPs' attitudes towards ADHD and found that although most GPs had positive attitudes towards the condition, a lack of specific training limited their ability to provide optimal care. GPs who had received training were more confident in managing ADHD, highlighting the importance of ongoing education for practitioners [15].

CONCLUSION

Children and adolescents with ADHD had a significantly lower probability of hospitalisation for mental illnesses when they participated in the GP-centered paediatric primary care program ($p = 0.015$). Furthermore, a significantly lower rate of psychopharmaceutical prescriptions ($p = 0.004$) was observed in the intervention group, suggesting that the program may be beneficial in controlling mental health difficulties connected to ADHD.

These findings suggest that GP-centred care may play a crucial role in improving outcomes for children with ADHD, particularly in reducing the need for hospitalizations and reliance on medication. The results emphasize the importance of continued support and access to comprehensive primary care for this vulnerable population.

LIMITATION

The limitations of this study include a small sample population who were included in this study.

Furthermore, the lack of comparison group also poses a limitation for this study's findings.

RECOMMENDATION

Future research should explore the long-term effects of GP-centred care on ADHD management and assess its applicability in diverse healthcare settings. Additionally, enhancing access to psychotherapy services within the GP-centred model may further optimize outcomes.

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CONFLICT OF INTEREST

The authors have no conflicting interests to declare.

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No funding received.

LIST OF ABBREVIATION

ADHD - Attention-deficit/hyperactivity disorder

GP - General Practitioner

ICD - International Classification of Diseases

SD - Standard Deviation

OR - Odds Ratio

RR - Relative Risk

ATC - Anatomical Therapeutic Chemical (classification system)

CI - Confidence Interval

CAMHS - Child and Adolescent Mental Health Services

CBT - Cognitive-Behavioral Therapy

PCMH - Patient-Centered Medical Home

WHO - World Health Organization

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